EXPLORATION MEDICAL CAPABILITY SYSTEM ENGINEERING OVERVIEW

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Deep Space Gateway and Transport missions will change the way NASA currently practices medicine. The missions will require more autonomous capability compared to current low Earth orbit operations. For the medical system, lack of consumable resupply, evacuation opportunities, and real-time ground support are key drivers toward greater autonomy. Recognition of the limited mission and vehicle resources available to carry out exploration missions motivates the Exploration Medical Capability (ExMC) Element's approach to enabling the necessary autonomy. The ExMC Systems Engineering team's mission is to "Define, develop, validate, and manage the technical system design needed to implement exploration medical capabilities for Mars and test the design in a progression of proving grounds." The Element's work must integrate with the overall exploration mission and vehicle design efforts to successfully provide exploration medical capabilities.

ExMC is using Model-Based System Engineering (MBSE) to accomplish its integrative goals. The MBSE approach to medical system design offers a paradigm shift toward greater integration between vehicle and the medical system, and directly supports the transition of Earth-reliant ISS operations to the Earth-independent operations envisioned for Mars. This talk will discuss how ExMC is using MBSE to define operational needs, decompose requirements and architecture, and identify medical capabilities needed to support human exploration. How MBSE is being used to integrate across disciplines and NASA Centers will also be described.

The medical system being discussed in this talk is one system within larger habitat systems. Data generated within the medical system will be inputs to other systems and vice versa. This talk will also describe the next steps in model development that include: modeling the different systems that comprise the larger system and interact with the medical system, understanding how the various systems work together, and developing tools to support trade studies.